

IN THE CLAIMS

1. (Currently Amended) ~~Polyphase~~ A polyphase filter ~~consisting of having~~ N branch allpass filters of order  $x \cdot N$  ~~to that filter an input signal  $t(k)$ , characterized by said polyphase filter comprising:~~

[[ - ]] a structure of an allpass filter of order x comprising delay elements with a delay of 1 and at least one multiplier, wherein all the delay elements with a the delay of 1 are replaced by delay elements with a delay of N in order to decrease a sampling rate of each of the N branch allpass filters of order  $x \cdot N$ , and

[[ - ]] a wherein the sampling rate  $f_s' = f_s/N$ , with  $f_s$  being the sampling rate of the input signal,  $t(k)$  for each of the N branch allpass filters of order  $x \cdot N$ , where x is an integer number and N is a decimation factor of the polyphase filter; and

wherein said polyphase filter increases a number of Intermediate Frequencies (IF) utilized in selecting the sampling frequency.

2. (Currently Amended) ~~Filter~~ The filter according to claim 1, ~~characterized in that~~ wherein each of said at least one multiplier respectively comprises N time-multiplexed multiplication coefficients  $(a_0, \dots, a_{N-1}; x_0, \dots, x_{N-1})$  that are used in a predetermined order  $(a(k) = a(k \bmod N); iC(k) = x(k \bmod N)).$

3. (Currently Amended) ~~Filter~~ The filter according to claim 1, ~~characterized by:~~ further comprising:

[[ - ]] a first delay element (~~1~~) with a the delay of N that receives the input signal ( ~~$t(k)$~~ );

[[ - ]] a first adder (~~3~~) that receives ~~the~~ an output signal of said first delay element (~~1~~) at a first input for ~~the~~ a first summand;

[[ - ]] a second delay element (~~2~~) with a the delay of N that receives ~~the~~ a sum produced by said first adder (~~3~~);

[[ - ]] a first subtracter (~~4~~) that receives the input signal ( ~~$t(k)$~~ ) at a the first input for ~~the~~ a minuend and the output signal of the second delay element (~~2~~) at a second input for ~~the~~ a subtrahend; and

[[ - ]] a first multiplier (~~5~~) that receives ~~the~~ a calculated difference of the first subtracter (~~4~~), multiplies ~~it respectively~~ said first subtracter with a predetermined multiplication coefficient ( ~~$\alpha(k)$~~ ) and outputs ~~the~~ a calculated product to a the second input of the first adder (~~3~~) that receives ~~the~~ a second summand, wherein

[[ - ]] in case  $x$  equals to 1 the sum produced by said first adder (~~3~~) builds the output signal ( ~~$u(k)$~~ ) out of the branch allpass filters.

4. (Currently Amended) ~~Filter~~ The filter according to claim 3, ~~characterized by:~~ further comprising:

[[ - ]] a second adder (~~6~~) that receives the output signal of the second delay element (~~2~~) at a the first input for the first summand;

[[ - ]] a third delay element (~~7~~) with a the delay of N that receives the sum produced by said second adder (~~6~~);

[[ - ]] a second subtracter (8) that receives the sum produced by said first adder (3) at a the first input for the minuend and the output signal of the third delay element (7) at a the second input for the subtrahend; and

[[ - ]] a second multiplier (9) that receives the calculated difference of the second subtracter (8), multiplies ~~it respectively~~ said second subtracter with a predetermined multiplication coefficient ( ~~$x(k)$~~ ) and outputs the calculated product to a the second input of the second adder (6) that receives the second summand, wherein

[[ - ]] in case  $x$  equals to 2 the sum produced by said second adder (6) builds the output signal ( ~~$u(k)$~~ ) out of the branch allpass filters.

5. (Currently Amended) ~~Filter~~ The filter according to claim 2, ~~characterized in that~~ every one of said at least one multipliers (5, 9) wherein each of said at least one multiplier has quantised quantized coefficients so that it can be realised each of said at least one multiplier is realized by at least one shift register, at least one adder or at least one subtracter.

6. (Currently Amended) ~~Filter~~ The filter according to claim 5, ~~characterized in that one multiplier (5, 9) wherein each of said at least one multiplier comprises:~~

[[ - ]] a first shift register (10) ~~having that has~~ a shift value of 2 [[2]] and that is receiving the receives a multiplicand and,

[[ - ]] an input selector switch (~~S2~~) ~~receiving the~~ that receives an output value of said first shift register (10) at a first fixed input terminal and the multiplicand at a second fixed input terminal,

[[ - ]] a second shift register (11), a third shift register (12) and a fourth shift register (13) ~~each having its~~ , an input of each of the second, third and fourth shift registers being connected to ~~the~~ a moveable output terminal of said input selector switch (S2).

[[ - ]] a third subtracter (14) ~~receiving that receives~~ the output value of said second shift register (11) at a the first fixed input terminal receiving ~~the~~ a minuend,

[[ - ]] a first output selector switch (S3) having ~~its~~ a moveable input terminal connected to ~~the~~ an output of said third shift register (12), ~~its first fixed output terminal runs free and its~~ the second fixed output terminal is connected to a second input of the third subtracter (14) ~~receiving~~ the that receives a subtrahend,

[[ - ]] a third adder (15) ~~receiving that receives~~ the output value of said third subtracter (14) ~~at a first input receiving the~~ and that receives a first summand, and ~~outputting~~ outputs the multiplied multiplicand,

[[ - ]] a second output selector switch (S4) having ~~its~~ a moveable input terminal connected to ~~the~~ an output of said fourth shift register (13), ~~its first fixed output terminal runs free and its~~ the second fixed output terminal is connected to a second input of the third adder (15) ~~receiving~~ the that receives a second summand.

7. (Currently Amended) ~~Filter~~ The filter according to claim 1, ~~characterized in that a~~ wherein the polyphase filter of order  $x \cdot N$  with  $x = a$  is ~~realised~~ realized in a time multiplex and works with a clock frequency  $f_c = a \cdot f_s$ , where x and a are integer numbers.

8. (Currently Amended) An IQ-generator, characterized in that an incoming sampled bandpass signal  $s(k)$  gets multiplied comprising:

a multiplier for multiplying an incoming sampled bandpass signal by a signal  $A(k)=(-1)^{\text{floor}(k/N)}$  before being supplied as input signal  $t(k)$  to and outputting a signal  $t(k)$ ;  
and

a polyphase filter consisting of having  $N$  branch allpass filters (22) of order  $x \cdot N$ , having an input coupled to the output of said multiplier, and having a sampling frequency, where  $k$  is an input value,  $N$  is a decimation factor of the polyphase filter,  $x$  is an integer number,  $A(k)$  is a first signal and  $\text{floor}(x)$  is the greatest integer function, which gives the largest integer less than or equal to  $x$ ; and

wherein said polyphase filter increases a number of Intermediate Frequencies (IF) utilized in selecting the sampling frequency.

9. (Currently Amended) An IQ-generator according to claim 8, characterized in that wherein the output signal of the polyphase filter having branch allpass filters (22) gets is multiplied by a signal  $B(k) \cdot \cos(2\pi f_0/f_s \cdot k)$  to calculate the an I-component of the a complex baseband signal and by a signal  $B(k) \cdot \sin(2\pi f_0/f_s \cdot k)$  to calculate the a Q-component of the complex baseband signal with  $A(k)=B(k)=(-1)^{\text{floor}(k/n)}$ , where  $f_s$  is the sampling frequency,  $f_0$  is a center frequency of the input signal,  $n$  is an integer number in the range of  $[-N/2 \dots N/2]$  and  $B(k)$  is a second signal.

10. (Currently Amended) An IQ-generator in which an according to claim 8, wherein the  
incoming sampled bandpass signal  $s(k)$  ~~gets~~ is multiplied by a the signal  $A(k)=(-1)^{\text{floor}(k/N)}$   
before being supplied as the input signal  $t(k)$  to a the polyphase filter consisting of N branch  
allpass filters of order  $x \cdot N$ , ~~characterized by one~~ wherein the polyphase filter ~~according to~~  
~~claim 1 to filter the~~ filters an I-component and ~~the~~ a Q-component of a complex baseband signal.